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ABSTRACT

Citing the failure of film, radio, and television to revolutionize the American education system, this paper identifies reasons for those failures and suggests ways to avoid similar failure in the diffusion of computer use in education and the diffusion of "datafication" into the homes of rural America. Four steps are identified to facilitate the introduction of technological change and to increase its acceptance by those who will use it: (1) find solutions for discovered needs rather than finding needs for discovered solutions; (2) build support from the grassroots up rather than from the bureaucracy down; (3) make technology work for the users rather than making users work for the technology; and (4) give customers what they want, not just what they need. Additional steps are identified for the diffusion of datafication of rural schools: pay attention to needs of users rather than the discoveries of researchers; let the users express how technology can benefit them; keep the innovation simple; and sell the benefits of change. (Contains 18 references.) (JLB)

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Innovation for the Common Man:

Avoiding the Pitfalls of Implementing New Technologies

A paper presented at the

Second Annual Conference on Rural Datafication

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ABSTRACT:

Similar reasons kept the major innovations of film, radio, and television from having their predicted effects on American education. This paper identifies reasons for those failures and suggests steps to avoid similar failure in the diffusion of computer use in education and the diffusion of "datafication" into rural America. Those steps are (1) find solutions for discovered needs, not needs for discovered solutions, (2) build support from the grassroots up rather than from the bureaucracy down, (3) make technology work for the users; do not make the users work for the technology, and (4) give customers what they want, not just what they need.

Introduction

Film, radio, and television have attempted to revolutionize the American educational system. All failed. Computers are the current "revolution" in education. What lessons can we learn from the past to avoid another technological failure in education? And how can we apply these lessons to the process of introducing "datafication" into the homes of rural America?

Educational Film

In the first quarter of the century, instructional film was heavily promoted. Thomas Edison went so far as to say in 1913,

> Books will soon be obsolete in the schools. Scholars will soon be instructed through the eye. It is possible to teach every branch of human knowledge with the motion picture. Our school system will be completely changed in ten years. (Saettler, 1990, p. 98)

Certainly, administrators saw the use of film in the classroom as a symbol of educational sophistication (Cuban, 1986). Projectors became safer, more affordable, and easier to use so that adequate amounts of film equipment became available in many American schools. In addition, no less than 17 different producers of educational films were established (Saettler, 1990).

Students in classes which used film extensively for teaching scored as well as or better than students in classes which did not use film (Cuban, 1986). Yet film still failed to become all that its supporters predicted.

A Rockefeller Foundation study of this failure listed 11 causes including "Heads of educational institutions have devoted little time, energy or thought to the organization, supervision and administration of visual education" and "Many teachers have been timid about operating the machines. Many, also, would not take the trouble to order films, set up the projector, etc. even when such were available for use" (Saettler, 1990, p. 107).

Instructional Radio

In the second quarter of the century, educational radio was lauded as the way to bring exceptional educational opportunities to all students of all schools. William Levenson, director of the Ohio School of the Air, declared, "The time may come when a portable radio receiver will be as common in the classroom as is the blackboard. Radio instruction will be integrated into school life as an accepted educational medium" (Cuban, 1986, p. 19). Yet radio's decline began almost as soon as its rise. The specialists who supported radio's use simply could not agree on the best way to reach their goals (Saettler, 1990).

Instructional Television

In the third quarter of the century, instructional television was given every opportunity to revolutionize educational practice and received unprecedented support. In the early 1950's increasing concern existed about poor quality in and overcrowding of the nation's schools (Cuban, 1986). The Cold War was at its height, the United States was trailing the Soviet Union in math and science skills necessary for the race to technological superiority, and teachers in those subjects were in short supply. Television promised to carry the teaching skills of that limited number of teachers into far more classrooms than they could ever reach in person. In response to these and other motivations, the Ford Foundation, the Carnegie Foundation, and the federal government poured millions of dollars into educational television (Gross, 1988; Saettler, 1990).

Yet instructional television shared common problems with instructional radio. Audio tape was not introduced in America until after World War II. Video tape suitable for classroom use was not available until the 1970's. Thus, teachers had to make sure that the equipment was properly set-up and that their students were ready to receive live programs. And once a program was over, there was no way to retrieve it for future use. Teachers had in effect lost control of their classrooms (Cambre, 1991; Cuban, 1986). To

regain control, teachers quietly blocked these technologies out of their lesson plans.

Learning from the Past

Millions and millions of dollars have been spent on these "big media" innovations (Schramm, 1977) to buy equipment, build production facilities, and even fly television transmitters around and around in the sky in the Midwest Program on Airborne Television Instruction (Gross, 1988). Yet the lasting results on the educational process of these expenditures are negligible (Wagschal, 1986).

George Santayana has warned, "A people which fails to learn from its history is doomed to repeat it" (Evans, B., 1968, p. 511). Technologists need to learn why earlier "big media" failed to meet their potential because in this last quarter of the century, a new "big media" has been making its cavalry charge onto the American educational scene. We must learn what to do differently to keep the millions of dollars being spent on computers in schools from leaving, thirty years from now, negligible results similar to those left by the other big media.

Computers: The Next Big Media

Computers are the current darlings of the educational world. Further, Papert (1993) and Perelman (1992) believe that computers will replace schools

altogether (compare with Edison's quote above). Yet Eggers and Wedman noted a decade ago in their article "The Growing Obsolescence of Computers in Education" (1984) that "...if computer technology is being used for the wrong reason, or if it is used incorrectly, computers could then be said to be ineffective and may as well be considered obsolete" [emphasis in the original] (p. 27). The intervening years have proven their concern well founded.

Although millions of dollars have already been invested and millions more will be spent, computers in education are already failing to live up to the glowing prophesies of their proponents (Papert, 1993). Closets full of unused computer equipment can be found in schools all over the country (Wagschal, 1986). Educators must change their approach to computers in education, or computers will languish on the sidelines of the educational process as have the other big media of the Twentieth Century.

Common Problems

Schools buy computers for many of the same reasons that schools bought projectors, radios, and televisions: prestige, "everybody is doing it," and "technology is good" (Cuban, 1986). Eggers and Wedman (1984) call it the "computer bandwagon" syndrome. They identify schools having the syndrome as

(a) having no specified purpose for computers, just lots of

> computers; (b) having large numbers of teachers unfamiliar with computer operation, while requiring teachers to pay their own tuition to gain the necessary skills; (c) having no concept of how to integrate computer technology into the curriculum...; and (d) having little or no awareness of the potential problems associated with computer use, while devising schemes to secure more computers and increase computer use. (p. 27)

Those were the problems of 1984, and they are still the problems of 1994. Administrators and educational technologists must learn that computers (any technology for that matter) are not of themselves solutions. In fact, the teachers upon whom these technologies were forced saw them, see them, as part of the problem.

Real Solutions

The change agents who introduced these technological innovations failed to account for at least two principles of innovation adoption: change is not an event -- it is a process; and change has to happen within individuals (Hord, Rutherford, Huling-Austin, & Hall, 1987). Yet administrators appeared by their actions to think that simply installing projectors, televisions, and computers in classrooms would result in teachers changing the way they teach.

Four Changes

Some simple adjustments in approaching the introduction to technological change will significantly increase acceptance by those who must use it.

Change one.

Find solutions for discovered needs, not needs for discovered solutions.

Administrations introduce technology as the solution to education's problems, and then insist that teachers use it. But teachers deal with specific classroom problems. Unless the technology is designed with the specific classroom needs of teachers in mind, it will only create worse problems for the teacher and stands a much greater chance of ending up unused and unwanted.

The simple solution is to involve classroom teachers in the process of determining in what ways computers can and should be used in the classroom. That for the most part has not happened.

Change two.

Build support from the grassroots up rather than from the bureaucracy down.

Eggers and Wedman's "bandwagon" criteria highlight a problem stressed by Cuban (1986): The new technologies were all pushed by foundation

executives, educational administrators, and equipment suppliers, NOT by the teachers who would use them.

In a "center periphery" system of innovation diffusion [in which change is brought about from one central leadership location], diffusion is limited by the amount of time and personal energy the change agent can provide and by the communication infrastructure through which the agent must communicate.

Likewise, a center periphery system is limited in its ability to handle feedback from the periphery (Schon, 1972). Without feedback, the process of innovation adoption can not accommodate the different needs of individual schools and teachers. And when a technological innovation fails to meet the specific needs of an individual teacher, that teacher will fail to adopt it.

Additionally, computer technology is changing so fast, a single change agency source can not keep up with all of the advances and thus with all of the possible applications of that technology.

Once teachers get a vision for what can be done with new technology, creative and diverse applications will spring up in schools everywhere just as fast as administrations can support their teachers' ingenuity.

Change three.

Make technology work for the users; do not make the users work for the technology.

Instructional radio and television removed much of the teachers' control over their own classrooms. Bulky equipment with poor signal quality along with poor quality programming that was scheduled at inopportune times matched with insufficient information and time given to the teacher to prepare the class for the presentation created more problems for the teacher than the technology solved (Cuban, 1986).

While the introduction of audio and video tape alleviated some of the scheduling problems, teachers still had to deal with the problems of equipment availability, reliability, and compatibility.

These same problems exist for computers. Teachers are given intimidating pieces of equipment and inadequate software. They are given little or no training in the use of either, yet are expected to demonstrate them in front of students who know more about them than the teachers do. Teachers are given no release time to learn how to use either, but are expected to spend dozens of hours -- again with no compensation -- to develop lessons that must somehow compare in quality to the sophisticated video games on which thousands of dollars have been spent in development costs. The risk of embarrassment, loss of prestige, and personal cost is enough to daunt all but the most intrepid of "Indiana Jones" educators.

Change four.

Give customers what they want, not just what they need.

Any good salesperson knows that customers will buy something if they want it badly enough. At the same time they will not buy something just because the salesperson says they need it.

In the same way, teachers will buy into an innovation if they can see enough advantages in it to cause them to want it. They will not buy into something just because the administration tells them that they need it. Teachers, after all, are the only ones who can accurately determine how a technology will fit into the life of their classrooms (Wagschal, 1986).

Technological innovation requires teachers to change from their traditional classroom approach. Most teachers would be willing to do that if it helped them help their students. But technological innovation, as it has historically been diffused into the classroom, has had an opposite effect by placing greater burdens on the teachers, thus taking them away from their primary task of educating students.

"Tube to Transistor" Education

Transistors were invented by engineers who did not limit themselves to creating a better vacuum tube, but rather sought to find a better way to do what vacuum tubes do. What if product manufacturers had determined that

changing their engineering and their assembly lines was not worth the trouble? [They would have gone out of business! But in education, reputation is at stake, not profit (Rubin, 1983).] In this light, technologists feel that teachers have a responsibility to explore the potential of new technologies.

Computerization will be forced on teachers by students and parents who have been acclimated to the wealth of learning opportunities in their own homes.

With all of the learning opportunities available through cable television and computer programs and the developing technologies such as video dial tone, Perelman (1992) declares that schools themselves are obsolete. Papert (1993, p. 9) while less drastic in his observations does note that

> Children who grow up with the opportunity to explore the jungles and the cities and the deep oceans and ancient myths and outer space will be even less likely than the players of video games to sit quietly through anything even vaguely resembling the elementary-school curriculum as we have known it up to now!

Adult learners learn because they want to learn: because they are curious or because they feel a need to know (Knowles, 1990). Younger learners (ages 10 and 16 in the research) do their out-of-school learning for the

same reasons (Tough, 1979).

Especially at the higher grade levels, teachers can not possibly know everything that their students will be able to learn via computer. So teachers need to change from being "fountains of knowledge" to learning facilitators (Perelman, 1992).

Change will occur because the "clients" will insist upon it, but hopefully also because teachers will have more control over the design of it.

Datafication Application

Rural datafication attends to a number of constituencies other than education, but the application carries over to each of them.

Needs, Not Discoveries

Pay attention to the human side of innovation (Thor, 1993). We must start where the users are, with their needs, not with our discoveries. We must allow room for revision and reconsideration of our plans. We can not, at the beginning, set rules down in concrete (Rubin, 1983).

Let the Users Think of It

We must pique the users' interest and cause them to explore. Allow them to express how the technology can benefit them. People who change must feel that the change is their own (Rubin, 1983). They must see the goals as desireable and doable (Evans, R.L., 1993).

Keep It Simple

The harder users have to work at using an innovation, the less likely they are to be users.

Sell the Benefits

Change from the traditional ways of doing things will be viewed skeptically by those who have an investment (of whatever kind) in the traditional ways. Change will succeed only when participants identify a decrease in burdens and an increase in beneficial experiences (Barron, 1985; Rubin, 1983).

Additionally, participants need to see that advocates of the innovation are invested not only in the innovation but in the people who take the risk of change (Evans, R. L., 1993).

Conclusion

Not everyone will accept the innovation of datafication that we labor to bring them. Machiavelli notes, "There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain of success than to take the lead in introducing a new order of things" (in Thor, 1993, p. 7). Yet the benefits to our communities, our country, and even ourselves make it a laudable task. Employ the wisdom of the immortal Yogi Berra (in Thor, 1993, p. 8), who advised, "The best way to get something done is to begin."

References

Barron, D. D. (1985). Electronic outreach: Television, the distant learner, and the library school. College of Library and Information Science at the University of South Carolina. (ERIC Document Reproduction Service No. ED 268 990)

Cambre, M. A. (1991). The state of the art of instructional television. In G. J. Anglin (Ed.), Instructional technology: Past, present, and future (pp. 267-275). Englewood, CO: Libraries Unlimited.

Cuban, L. (1986). Teachers and machines: The classroom use of technology since 1920. New York: Teachers College Press.

Eggers, J. R., & Wedman, J. F. (1984). The Growing obsolescence of computers in education. Educational Technology, 24(7), 27-29.

Evans, B. (Ed.). (1968). Dictionary of quotations. New York: Delacorte.

Evans, R. L. (1993). The human face of reform: Meeting the challenge of change through authentic leadership. Wellesley, MA: Human Relations Services, Inc. (ERIC Document Reproduction Service No. ED 356 533)

Hord, S. M., Rutherford, W. L., Huling-Austin, L., & Hall, G.E. (1987). Taking charge of change. Alexandria, VA: Association for Supervision and Curriculum Development. (ERIC Document Reproduction Service No. ED 282 876)

Gross, L. S. (1988). Telecommunications: An introduction to electronic media (2nd ed.). Dubuque, IA: Wm. C. Brown.

Knowles, M. S. (1990). The adult learner: A neglected species (4th ed.). Houston: Gulf Publishing.

Papert, S. (1993). The children's machine: Rethinking school in the age of the computer. New York: Basic Books.

Perelman, L. J. (1992). School's out: Hyperlearning, the new technology, and the end of education. New York: Wm. Morrow.

Rubin, S. G. (1983). Overcoming obstacles to institutionalization of experiential learning programs. In T. C. Little (Ed.), Making sponsored experiential learning standard practice (pp. 43-54). San Francisco: Jossey-Bass.

Saettler, L. P. (1990). The evolution of American educational technology. Englewood, CO: Libraries Unlimited.

Schon, D. A. (1972). The diffusion of innovation. In C. J. Lynch (Ed.), Managing advancing technology: Volume I/Strategies and tactics of product innovation (pp. 3-20). American Management Association.

Schramm, W. L. (1977). Big media, little media. Beverly Hills: Sage Publications.

Thor, L. M. (1993). The human side of quality: Employee care and empowerment. Paper presented at the League for Innovation in the Community College's Conference Community Colleges and Corporations: Partners in Total Quality Management. (ERIC Document Reproduction Service No. ED 354 044)

Tough, A. (1979). The adult's learning projects: A fresh approach to theory and practice in adult learning (2nd ed.). Austin, TX: Learning Concepts.

Wagschal, P. H. (1986). Computers in the schools: Lessons from television. Curriculum Review, 25(3), 32-34.